UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/709,312	04/28/2004	Edward W. Conrad	BUR920040098US1	3311

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EXAMINER
SHECHTMAN, SEAN P

ART UNIT	PAPER NUMBER
2125	

DATE MAILED: 09/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/709,312	CONRAD ET AL.
	Examiner	Art Unit	
	Sean P. Shechtman	2125	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 April 2004*.
2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
   closed in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.
   4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-29* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on *28 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.
   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a)☐ All   b)☐ Some * c)☐ None of:
   1.☐ Certified copies of the priority documents have been received.
   2.☐ Certified copies of the priority documents have been received in Application No. _____.
   3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
      application from the International Bureau (PCT Rule 17.2(a)).
   * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892) ●
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
   Paper No(s)/Mail Date *4/28/04*. ○
4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____ .

DETAILED ACTION

1. Claims 1-29 are presented for examination.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 24-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

2. Claim 24 recites the limitation "the current metrology process" in line 7. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-3, 5, 7-9, 12-16, 19-21, and 23-28 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Pat. No. 6,055,463 to Cheong.

Referring to claims 1, 5, 7-9, 12-16, 19-21, and 23-28, Cheong teaches a method, system, and program of optimizing a manufacturing process processing a workpiece (Col. 9, lines 33-54),

comprising: providing a database of operational data gathered from previously performed

semiconductor fabrication processes gathered from previously processed workpieces (Abstract),

wherein the database can be filtered into subgroups of operational data or wherein the database

can be filtered into a data subset (Col. 13, lines 3-6 and lines 18-20); providing a set of filters

that include operational parameters of the current metrology process; filtering the database with a

selected filter to generate a data subset, though, not necessarily filtering with any of the set of

filters (Col. 2, lines 13-26); calculating evaluation criteria for a selected data subset or a selected

subgroup, though, not necessarily a data subset or subgroup that has been filtered, except in

claim 7 (Col. 13, lines 21-37); determining whether the evaluation criteria satisfy predetermined

requirements; if the evaluation criteria satisfy the predetermined requirements, determining

operating conditions of the manufacturing process by the selected subgroup of operational data

based on the calculated evaluation criteria; if the evaluation criteria do not satisfy the

predetermined requirements, repeating the method with a different selected subgroup of

operational data (Col. 14, lines 28-36).

Referring to claims 2 and 3, Cheong teaches the method above, wherein the step of

processing the workpiece comprises measuring the workpiece at a measuring step or not

measuring the workpiece at a measuring step (Col. 13, lines 20-37).

4.   Claim 16 is rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Pat. No.

5,845,237 to Puel.

Referring to claim 16, Puel teaches a method, system, and program of optimizing a

manufacturing process, comprising: providing a database of operational data gathered from

previously performed manufacturing processes (Col. 7, lines 4-12), wherein the database can be

filtered into subgroups of operational data or wherein the database can be filtered into a data

subset (Col. 7, lines 14-18); filtering the database into a plurality of data subsets (Col. 7, lines

14-18); calculating evaluation criteria for a selected data subset or a selected subgroup, though,

not necessarily a data subset or subgroup that has been filtered, except in claim 7 (Col. 7, lines

40-48); determining whether the evaluation criteria satisfy predetermined requirements (Col. 8,

lines 1-18); and repeating the calculating and determining processes for a new data subset if the

selected data subset fails to provide evaluation criteria that meet the set of predetermined

requirements (Col. 8, lines 11-17).

5.   Claims 7, 8, 12, 24, and 25, are rejected under 35 U.S.C. 102(e) as being anticipated by

U.S. Pub. No. 2004/0093107 to Good.

        Referring to claims 7, 8, 12, 24, and 25, Good teaches a method, system, and program of

optimizing a manufacturing process processing a workpiece (Title; Page 2, paragraph 21),

comprising: providing a database of operational data gathered from previously performed

semiconductor fabrication processes gathered from previously processed workpieces (Page 2,

paragraph 23), wherein the database can be filtered into subgroups of operational data or wherein

the database can be filtered into a data subset (Page 6, claim 1, "subset of the process steps");

providing a set of filters that include operational parameters of the current metrology process

(Page 3, paragraphs 30-31); filtering the database with a selected filter to generate a data subset,

though, not necessarily filtering with any of the set of filters (Page 6, claim 1); calculating

evaluation criteria for a selected data subset or a selected subgroup, though, not necessarily a

data subset or subgroup that has been filtered, except in claim 7; determining whether the

evaluation criteria satisfy predetermined requirements; repeating the method with a different

selected subgroup of operational data; and determining operating conditions of the

manufacturing process based on the calculated evaluation criteria (Page 6, Claim 1, last

paragraph).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

(1). Determining the scope and contents of the prior art.
(2). Ascertaining the differences between the prior art and the claims at issue.
(3). Resolving the level of ordinary skill in the pertinent art.
(4). Considering objective evidence present in the application indicating obviousness or nonobviousness.

6.   Claims 1, 2, 7-9, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over

U.S. Pat. No. 4,320,463 to Himmelstein in view of Meriam-Webster's Collegiate Dictionary.

Referring to claims 7 and 8, Himmelstein teaches a system for optimizing a

manufacturing process, comprising: a statistical computer with operational data gathered from

previously performed manufacturing processes (Col. 3, lines 60-68; Col. 4, lines 21-52); a

filtering system for filtering the statistics in the computer into a data subset (Col. 4, lines 35-45;

Col. 2, lines 1-14); a calculation system for calculating evaluation criteria for the data subset

(Col. 4, lines 46-49); an iteration system that causes the filtering and calculation systems to be

rerun for a different data subset (Col. 4, lines 21-34; Col. 2, lines 1-14); and a system for

determining operating conditions of the manufacturing process based on the calculated

evaluation criteria (Col. 3, lines 53-55; Col. 4, lines 5-15); and an analysis system for

determining if the evaluation criteria meets a set of predetermined requirements (Col. 4, lines 1-

15); and wherein the evaluation criteria further comprises a sample size (Col. 4, lines 35-45, for

example, 20 products).

Referring to claims 1, 2, 9, and 16, Himmelstein teaches a method, system, and program

of optimizing a manufacturing process processing a workpiece (Fig. 1, element P), comprising:

providing a statistical computer of operational data gathered from previously processed

workpieces, wherein the statistics of the statistical computer can be filtered into subgroups of

operational data or wherein the statistics of the statistical computer can be filtered into a data

subset (Col. 3, lines 60-68; Col. 4, lines 21-52); filtering the statistics of the statistical computer

with a selected filter to generate a data subset (Col. 4, lines 35-45; Col. 2, lines 1-14); calculating

evaluation criteria for a selected data subset or a selected subgroup, though, not necessarily a

data subset or subgroup that has been filtered, except in claim 7 (Col. 4, lines 46-49);

determining whether the evaluation criteria satisfy predetermined requirements (Col. 4, lines 1-

15); if the evaluation criteria satisfy the predetermined requirements, determining operating

conditions of the manufacturing process by the selected subgroup of operational data based on

the calculated evaluation criteria (Col. 4, lines 5-16; Col. 4, lines 53-56); if the evaluation criteria

do not satisfy the predetermined requirements, repeating the method with a different selected

subgroup of operational data (Col. 4, lines 46-58; Col. 2, lines 1-14).

Himmelstein clearly teaches a statistical computer that has a statistical sample of past product values (Col. 4, lines 35-45), wherein the values can describe both a product height (for example) and a nonrandom progressive failure in manufacturing (Col. 3, line 4 – Col. 4, line 52) (See also paragraph 19 of the instant specification; See also claim 19 of the instant specification). Himmelstein clearly teaches grouping the values in, for example, sets of 20 in the computer (Col. 4, lines 35-45). Himmelstein clearly teaches calculating a new standard deviation for evaluation of a nonrandom progressive failure (Col. 3, lines 60 – Col. 4, line 15) wherein both the grouping and calculating is done continuously and repetitively each time a product is manufactured (Col. 4, lines 21-52). Himmelstein clearly teaches determining when a nonrandom progressive manufacturing failure occurs as a result of the calculated standard deviation (Col. 4, lines 5-15). Himmelstein clearly teaches that if at any point in time during the manufacturing run a defect occurs which is outside the process limits a "determination is made… to stop further operation of the production apparatus" because the statistical group indicated exceeded process limits, satisfying the requirements to "stop further operation" to remedy the problem and avoid scrap loss in the production of products (Col. 4, lines 5-16; Col. 4, lines 46-57), And, if the limits are not exceeded, the standard deviations of statistical samples is constantly updated during the entire manufacturing process, for a "different group" (Col. 2, lines 1-14; Col. 4, lines 46-52).

Himmelstein clearly teaches a statistical computer has to a preselected group of product values including past product values and that calculates standard deviation relative to a filtered preselected group of product values including past product values. While Himmelstein clearly teaches the statistics are in the computer, Himmelstein fails to teach that the statistics are in a database.

The examiner respectfully asserts that paragraph 19 of the instant specification provides objective evidence present in the application indicating obviousness in the manner in which data is stored. The examiner respectfully submits that the claim 7, as such, does not actually require filtering operational data of the database into a data subset, only that it can be done. The examiner respectfully submits that claim 1, as such, does not require filtering a database into subgroups of operational data. The examiner respectfully submits that claim 1, as such, does not require calculating evaluation criteria for a selected subgroup of operational data selected from the subgroups of operational data to be filtered from the database. The examiner respectfully submits that claim 1, as such does not require that the selected subgroup of operational data be a process condition. The examiner respectfully submits that claim 16, as such, does not require calculating evaluation criteria for a selected data subset selected from the filtered subsets from the database.

However, Meriam-Webster's Collegiate Dictionary teaches a database is a collection of data organized especially for search and retrieval by a computer.

Therefore, it would have been obvious to one of ordinary skill in the art at the time that the invention was made to use a database in a computer. One of ordinary skill in the art would have been motivated to combine these references for the purpose of having the statistics data organized for rapid search and retrieval.

7.   Claims 4, 6, 10, 11, 17, 18, and 29 are rejected under 35 U.S.C. 103(a) as being

unpatentable over U.S. Pat. No. 6,055,463 to Cheong as applied to claims 1-3, 5, 7-9, 12-16, 19-

21, and 23-28 above, and further in view of U.S. Pat. No. 6,631,305 to Newmark.

Referring to claims 11 and 18, Cheong teaches that the evaluation criteria comprises a

sample size (Col. 13, lines 20-37).

Referring to claims 4, 6, 10, 17, and 29, Cheong teaches all the limitations above,

however, Cheong fails to teach the evaluation criteria includes a capability ratio and a normality

value.

However, referring to claims 4, 6, 10, 17, and 29, Newmark teaches analogous art,

wherein evaluation criteria includes a capability ratio and a normality value (Col. 26-27, claims

1-5).

Therefore, it would have been obvious to one of ordinary skill in the art at the time that

the invention was made to modify the system of Cheong with the system of Newmark. One of

ordinary skill in the art would have been motivated to combine these references because

Newmark teaches a system that uses capability analysis as a basis for implementing steps in

process optimization, thus identifying system process time performance weaknesses or defects,

and furthermore, for validating improvements (Col. 2, lines 50-64).

8.   Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No.

6,055,463 to Cheong as applied to claims 1-3, 5, 7-9, 12-16, 19-21, and 23-28 above, and further

in view of U.S. Pat. No. 6,789,031 to Wang.

Referring to claim 22, Cheong teaches all the limitations above, however, Cheong fails to teach the system above, wherein the repeating means is repeated for each of a plurality of data subsets for each of a plurality of candidate tools.

However, referring to claim 22, Wang teaches analogous art, wherein repeating means is repeated steps for each a plurality of data subsets for each of a plurality of candidate tools (Col. 10, lines 4-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify the system of Cheong with the system of Wang. One of ordinary skill in the art would have been motivated to combine these references because Wang teaches statistical quality control that can determine the statistical equivalence of known qualities. Furthermore, Wang teaches statistical quality control that can determine whether a multiplicity of processes are statistically equivalent to one another and of a desired quality (Col. 2, lines 9-37).

Conclusion

9.   The prior art or art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents or publications are cited to further show the state of the art with respect to repeating optimization steps based on an evaluation criteria until a process parameter is within a design requirement.

U.S. Pat. No. 6,148,268 to Wu (Col. 5, line 60 – Col. 6, line 6).

The following patents or publications are cited to further show the state of the art with respect to data filtering.

U.S. Pat. No. 6,684,177 to Mishra.

The following patents or publications are cited to further show the state of the art with respect to data grouping, analysis, evaluation, and resultant manufacturing processing for a multiparameter manufacturing process.

U.S. Pat. No. 5,339,257 to Layden (Col. 14, lines 9-47).

10.　　Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean P. Shechtman whose telephone number is (703) 305-7798. The examiner can normally be reached on 9:30am-6:00pm, M-F.
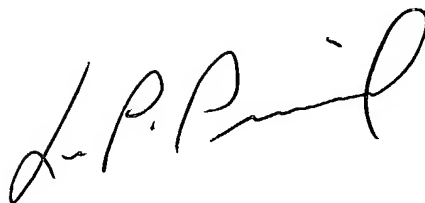
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo P. Picard can be reached on (703) 308-0538. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SPS

Sean P. Shechtman

September 8, 2004

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